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The impact of individual training macrocycle on the sports results of 14 and 15 year old swimmers

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Summary

The aim of work was to show the impact of training on the sports results of 14 and 15 - year old swimmers. A hypothesis was that a properly conducted training period significantly improves the athletes' result. The research was carried out on 4 people, one swimmer aged 14 and three athletes aged 15 from the sports club UKS 2 Tczew, based on an overworked training macrocycle in the period from September to March.

The training consisted of 10 training units during week (morning and afternoon). The tests included two somatic measurements and a measurement of sports results during official swimming competitions.

Based on the results of the research, it has been found that the impact of an individual training macrocycle is a very important factor, shaping the athletes' sports result. The consequence of an appropriate distribution of loads in training units resulted in the better time achievements. As a result, there has been an improvement in deposits during the competition and promotion in sports championship classes.

Introduction

Swimming as a physical activity and its assumptions in physical culture are known and described in sports literature around the world. Swimming, apart from shaping and correcting the posture, is also used for educational purposes (risk assessment and first aid in unfortunate accidents in the aquatic environment, learning proper behaviors), health (reduction of body weight, improvement of body efficiency, etc.).

There are also ways of active recreation in the water, basing on a use of swimming skills in water sports (windsurfing, sailing, rowing, etc.), the aspect of many years of training crowned during swimming competitions, as well as in shaping the cooperation in the group (Czabański, Fiłon, Zatoń, 2003).

We can see interest in swimming all over the world. It is a sport that has been rapidly developing at the turn of several decades thanks to the development of technology and modern teaching aids. Polish sportsmen gained recognition and popularity by securing leading positions during the World Championships, the Olympic Games thanks to such representatives as: Otylia Jędrzejczak, Paweł Korzeniowski, Konrad Czerniak, Radosław Kawęcki. Outstanding achievements of the national team of swimmers have contributed to the increase in the popularity of swimming, the emergence of new swimming clubs and mass children swimming learning (Rakowski, 2008). Achieving the best results depends to a large extent on the ways of planning the course and teaching aids that are widely available in swimming pools (fins, pasta, swimming boards, head tubes, simulators) (Platonov, 1997).

The most important components of the training can be:

- technical training (the most important element aimed at progression of the athlete's results),
- fitness training (directly affecting the swimmer's performance, speed, flexibility, endurance, strength and jumping exercises),
- mental training (adaptation to new conditions and ability to cope with stress) (Rakowski, 2008).

Aim of the work

The aim of the work is to demonstrate the impact of an individual training macrocycle on the sports performance of 14 - 15 year old athletes, who attend a sports school with a swimming profile. The evaluation of the results was made by comparing the results from the beginning of the training period and after the overworked winter macrocycle.

Material of research

The research group consisted of the UKS 2 Tczew swimming club athletes (at the Sports Primary School No. 2 in Tczew). They were junior high school students, a girl aged 14 and three boys aged 15. The duration of the training period was 8 - 9 years, with the training frequency of 10 times per week. The morning training unit - performed 6 times a week consisted of 15 minutes of warm-up on land and 90 minutes in water, whilst the afternoon one included 4 sessions a week, each being a 30 minute warm-up on the edge, with a special attention being paid to flexibility and strength, and 90 minutes of a specialist training in water.

All athletes have undergone medical examinations (once every 3 months) and also have a PPL license. The tests have been carried out twice. In the initial and the final phase of the macrocycle. The first measurement was recorded during the Grand Prix - Polish Cup in Łódź (07.11 - 8/11/2016), the second time at the Polish Junior Championships in Gliwice (11/03 - 13/03/2017) and also during the Polish Youth Junior Championships in Gorzów Wielkopolski (04/03 - 06/03/2017).

Athlete D.K. (15 years old) at the beginning of the macrocycle was a sports class player II / 17.18 (II sports class in the age category 17.18) at distances of 200m / 400m and class II at a distance of 1500m in freestyle. Player M.Ż. (15 years) in three breaststroke style competitions 50m / 100m / 200m was classified in sports class II / 17.18. Athlete I.W. (15 years) specializing in freestyle at distances of 400m / 800m he won the sports class II / 16 (II sports class, age category 16), while at the distance of 1500m class II / 17,18. Athlete O.W. (14 years old) swimming in individual medley achieved the sports class II / 17,18 on distances of 100m / 200m / 400m.

Research methods

1. The somatic parameters have been measured (height and weight).

2. Special fitness measurement has been performed on the basis of the sports result on the competition

-the tests have been done twice. The first measurement during the Grand Prix - Polish Cup in Łódź (November, 2016), the second measurement during the Polish Youth Junior Championships in Gorzów Wielkopolski (March 2017), as well as the Polish Juniors Championships in Gliwice (March 2017),

- the sports result has been confirmed on the basis of the official protocol of the competition.

3. Statistical methods - the minimum mean value, standard deviation and % increase of the results have been calculated.

Analysis of sports results

Analysis of somatic development of athletes (5/11/2016)

Table 1 shows the body height (cm) and body mass (kg) of competitors at the beginning of the training cycle and the macrocycle (September 2016).

It has been found that the body mass index to the body height of three competitors (D.K., I.W., O.W.) has normal values, which proves their proper development as well as the appropriate diet. Athlete M.Ż. presents values indicating the beginnings of underweight, result 18.0. BMI of male gender oscillates from 18.0 - 19.61, BMI female rider is in the limit of 20.1 (Table 1).

Table 1. Somatic measurements of UKS 2 Tczew athletes, September 2016.

L.p.	Athlete	Body height [cm]	Body weight [kg]	BMI
1.	<i>D.K</i>	169	56	19.61
2.	<i>M.Ż.</i>	165	49	18.0
3.	<i>I.W.</i>	170	55	19.0
4.	<i>O.W.</i>	164,5	54,8	20.1

Analysis of somatic development of athletes (02.03.2017)

The analysis of the height and weight results of athletes were made in March 2017 and showed that during six months there were height and mass changes in the body of each athlete (Table 2).

Table 2. Somatic measurements of UKS 2 Tczew athletes, March 2017.

L.p.	Athlete	Body height [cm]	Body weight [kg]	BMI
1.	<i>D.K</i>	170,5	56,7	19.5
2.	<i>M.Ż.</i>	165,5	49,6	18.1
3.	<i>I.W.</i>	172	57,1	19.3
4.	<i>O.W.</i>	165	55,3	20.2

The structure of the training load in the macrocycle

The macrocycle was composed of 20 weekly microcycles. The distribution of training loads was determined in detail by the planned annual start schedule of the players (Figure 1). The first measurement took place in 12 microcycle (renewal) which is noticeable by reducing the weekly load (less than 28.3 km) for the start of the Grand Prix in Łódź. It was preceded by a microcycle 11 (impact), as many as 58.1 km, were covered within a week's time. The purpose of this microcycle was physical and mental preparation for great effort and fatigue before the competition. The second measurement was made in 29 and 30 microcycles due to two different places of the competition. It was the period of BPS preparing for the main event of the winter season, which lasted from 24-30 microcycles. The first two weeks of BPS are characterized by a very large training volume (73.1 km and 73.2 km) and ended with control competitions in 26 microcycles. In subsequent weeks, the BPS structure was reduced to smaller and smaller volumes terminated with the main start in 29 and 30 microcycles. During this macrocycle, competitors jointly covered 933.8 km.

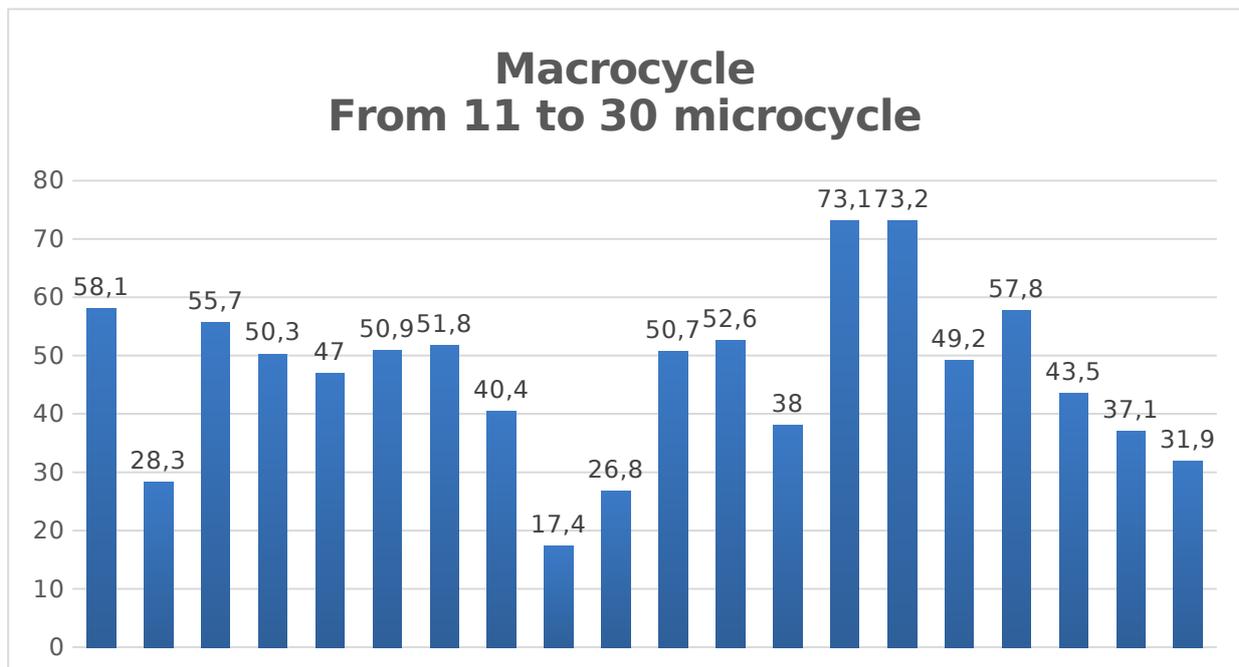


Figure 1. The structure of the training load in the macrocycle

Test results of athletes at competitions

The first stage, November 7, 2016 - November 8, 2016

Athlete M. Ź. in the breaststroke style at a distance of 50m / 100m / 200m.

The starts took place during the Grand Prix in Łódź on November 7, 2016. - 08/11/2016.

Starting at different distances, the competitor obtained the following results:

- 50m breaststroke style - 32.26 (29th place)
- 100m breaststroke style - 01: 09.33 (25th place)
- 200m in a breaststroke style - 02: 29.34 (16th place)

The competitor M.Ź. during the GP took distant places during his three crown distances in the breaststroke style. He did not beat any life records.

Athlete O.W. in an individual medley style on a distance of 100m / 200m / 400m.

During the first form check on the GP in Lodz 07.11. 2016 - 08/11/2016 obtained the following results:

- 100m individual medley style - 01: 10.17 (17th place)
- 200m individual medley style - 02: 29.75 (14th place)

- 400m in individual medley style - 05: 09.07 (11th place)

During the competition, she made deposits in the top 20. The best distance turned out to be 400m individual medley taking the 11th place.

Athlete I.W. freestyle at a distance of 400m / 800m / 1500m.

The starts took place during the Swimming Grand Prix in Łódź on 7-8th of November 2016. Athlete obtained following results:

- 400m freestyle - 04:22.09 (38 place)
- 800m freestyle - 09:01.83 (9th place)
- 1500m freestyle - 17:00 (9th place)

Athlete I.W. specializing in freestyle has achieved great results (9th place) in long-distance competitions (800m and 1500m) giving a great surprise and hope for the next starts. On a third distance (400m) with the result 04:22:09 finished on a 38th place.

Athlete D.K. in freestyle at a distance of 200m / 400m / 1500m.

The starts took place during the Swimming Grand Prix in Łódź (7-8th of November 2016). Athlete obtained following results:

- 200m freestyle - 02: 00.86 (44th place)
- 400m freestyle - 04: 15.54 (31 place)
- 1500m freestyle - 16: 21.35 (6th place)

Athlete during 1500 m reached the 6th place. In subsequent distances (200 m and 400 m), long-term deposits.

The second stage, March 4, 2017 – March 13, 2017

Athlete M. Ż. in the breaststroke style at a distance of 50m / 100m / 200m.

The finishing competition for the macrocycle took place during the Polish Winter Championships in Gorzów Wielkopolski, on 04/03/2017 - 06/03/2017. The athlete competed starts in three distances:

- 50m breaststroke style - 31.25 (10th place)
- 100m breaststroke style - 01: 07.42 (6th place)
- 200m breaststroke style - 02: 19.47 (1st place)

Achieved results oscillated into a gold medal and was the favorite on the 200m breaststroke in the final struggle, also improving RK seniors (Senior Club Record). In the same competition but at other distances (50m, 100m) he took equally strong positions, ranking in the first 10 to get a new HR (personal record).

Athlete O.W. in a individual medley at a distance of 100m / 200m / 400m.

The female athlete's competition during the Polish Winter Championships in Gorzów Wielkopolski took place 04-06 of March 2017. Athlete achieved following results:

- 100m individual medley style - 01: 06.28 (4th place)
- 200m individual medley style - 02: 23.11 (5th place)
- 400m with individual medley style - 04: 56.74 (3rd place)

O.W. swimmer on the 400m individual medley start won the bronze medal. In 100m she brushed herself against the podium taking 4th place, 200m reaching the 5th result. Three competitions have been given to her new seniors individual records.

Athlete I.W. freestyle at a distance of 400m / 800m / 1500m.

Starts finishing the macrocycle were in on 4-6th of March 2017 in Gorzów Wielkopolski. Swimmer achieved following results:

- 400m freestyle - 04: 12.41 (5th place)
- 800m freestyle - 08: 41.39 (2nd place)
- 1500m freestyle - 16: 25.35 (2nd place)

Athlete I.W. at 1500m freestyle swimming achieved silver medal and established seniors result. At 800m he finished second, while 400m finishing on 5th place. Both results gave him a new individual records.

Athlete D.K. in freestyle at a distance of 200m / 400m / 1500m.

After the winter macrocycle D.K. athlete competed at Polish Championship in Gliwice between 11/03/2017 - 13/03/2017, and achieved following results:

- 200m freestyle - 01: 54.66 (5th place)
- 400m freestyle - 03: 59.37 (5th place)
- 1500m freestyle - 15: 49.09 (3rd place)

In all competitions D.K. set up his best times. But also at 1500m won bronze with the new seniors individual record. In distances 200m and 400m he achieved fifth place.

Compare the results of individual athletes

Somatic measurements

Obtained results indicate that the height and weight of the athletes at the turn of the September - March increased. This is the result of an intense growth that is characteristic for a group of 14 - 15 year olds. The data show that male athletes (D.K., M.Ż., I.W.) have a greater weight gain (from 0.7 to 2.1 kg), as well as a higher increase in the body length (from 0.5 to 2 cm). In the case of a female athletes (O.W.), the changes are much smaller (Table 3).

Table 3. Somatic measurements of UKS 2 Tczew athletes

L.p.	Athlete	September 2016		March 2017		Result changes increase			
		[cm]	[kg]	[cm]	[kg]	[cm]	%	[kg]	%
1.	D.K.	169	56	170,5	56,7	1,5	0,88	0,7	1,25
2.	M.Ż.	165	49	165,5	49,6	0,5	0,3	0,6	1,22
3.	I.W.	170	55	172	57,1	2,0	1,18	2,1	3,82
4.	O.W.	164,5	54,8	165	55,3	0,5	0,7	0,5	0,91

Comparison of sports results

Analyzing the results of D.K. we can observe a significant improvement in all achieved results. In the 200 m competition, in the individual medley swimmer achieved an increase of 5.13%. In the 400 m individual medley competition biggest progression was observed (6.33%). On the other hand, at the 1500 m distance the smallest changes of the results was observed (3.29%) (Table 4).

Table 4. Progression of sports results of the D.K. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	PROCENT INCREASE OF RESULT
1.	200m	02:00.86	01:54.66	5,13%
2.	400m	04:15.54	03:59.37	6,33%
3.	1500m	16:21.35	15:49.09	3,29%

Table 5 shows the achievements of the M.Ž. swimmer. The biggest progression of the result was in 200 m breaststroke style, with the increase 6.61%. For the 50m breaststroke style improvement was 3.13%, and for 100m - 2.76%..

Table 5. Progression of sports results of the M.Ž. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	PERCENT INCREASE OF RESULT
1.	50m	32.26	31.25	3,13%
2.	100m	01:09.33	01:07.42	2,76%
3.	200 m	02:29.34	02:19.47	6,61%

Swimmer I.W. showed very similar positive increments in three different distances. The highest increase in the result was in the 800 m freestyle competition (3.77%). On the 400 m freestyle start the increase was 3.69%. For the 1500 m freestyle competition changes were 3.4% (Table 6)

Table 6. Progression of sports results of the I.W. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	PERCENT INCREASE OF RESULT
1.	400m	04:22.09	04:12.41	3,69%
2.	800m	09:01.83	08:41.39	3,77%
3.	1500m	17:00.00	16:25.35	3,4%

Athlete O.W. also made significant progress in each of his competition. The biggest improvement (5.54%), was achieved at a 100 m distance of in a freestyle style. In the 200m freestyle style competition, the result was improved by 3.99% (table 7).

Table 7. Progression of sports results of the O.W. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	PROCENT INCREASE OF RESULT
1.	100m	01:10.17	01:06.28	5,54%
2.	200m	02:29.75	02:23.11	4,43%
3.	400m	05:09.07	04:56.74	3,99%

Sports classes of athletes

The analysis showed that the swimmer D.K. achieved higher sports classes in his three leading competitions. In 100m and 200m freestyle from II / 17.18 for the second sports class. However, in the 400m freestyle, the swimmer reached the progression from the second senior sport class to the seniors first sports class (Table 8).

Table 8. List of a sport class achievements of D.K. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	Sport class	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	Sport class
1.	100m	01:10.17	II/17,18	01:06.28	II
2.	200m	02:29.75	II/17,18	02:23.11	II
3.	400m	05:09.07	II	04:56.74	I

Table 9 shows the results of M.Ž. on a 25m swimming pool. His progression in sports classes in the breaststroke style was from the second sports class of 17/18 years old in all competitions (50m, 100m, 200m) to second sports class of a seniors.

Table 9. List of a sport class achievements of M.Ž. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	Sport class	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	Sport class
1.	50m	32.26	II/17,18	31.25	II
2.	100m	01:09.33	II/17,18	01:07.42	II
3.	200 m	02:29.34	II/17,18	02:19.47	II

Athlete I.W. at the beginning of the macrocycle at the distance of 400m, 800m freestyle had the II sports class of 16-year-olds, after the macrocycle during the competition in these distances his

sports class increased to II for 17-18-year-olds. However, at a distance of 1500 m from the second sports class for a 17-18-year-olds the result improved and reached the second class of seniors (table 10).

Table 10. List of a sport class achievements of I.W. on the 25m swimming pool.

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	Sport class	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	Sport class
1.	400m	04:22.09	II/16	04:12.41	II/ 17,18
2.	800m	09:01.83	II/16	08:41.39	II/ 17,18
3.	1500m.	17:00.00	II/17,18	16:25.35	II

The data presented in table 11 for the O.W. athlete show that at distances of 100 and 400m, in the freestyle from the second sports class of a 17-18-year-olds athlete reached the senior first sports class. In 200m freestyle the result was equally satisfactory, where from the second sports class 17-18-year-olds he reached the second class of a seniors.

Table 11. List of a sport class achievements of O.W. swimmer on the 25m swimming pool

L.p.	DISTANCE	ACHIEVED RESULTS AT THE BEGIN OF A MACROCYCLE	Sport class	ACHIEVED RESULTS AT THE END OF THE MACROCYCLE	Sport class
1.	100m	01:10.17	II/17,18	01:06.28	I
2.	200m	02:29.75	II/17,18	02:23.11	II
3.	400m	05:09.07	II/17,18	04:56.74	I

Analyzing tables 8, 9, 10, 11, we can conclude that each swimmer improved his results, which leads into a higher sports class. It is a result of properly arranged training as well as appropriately distributed intensity in a individual microcycles.

Discussion

Somatic predispositions play a key role in natural selection among swimmers. According to W. Ziary (2011), body height and weight are undoubtedly very important factors in competitive swimming. Analyzing the predispositions of the leading world swimmers, eg Michael Phelps (193 cm and 88 kg), Paweł Korzeniowski (192 cm and 82 kg), among women Otylia Jędrzejczak (187 cm and 71 kg), Melissa Franklin (188 cm and 77 kg). The arithmetic mean of men among Olympic winners from Beijing was 189.6 cm and 85.5 kg. On the other hand, among women taking part in Beijing it was 176.6 cm and 65 kg.

Comparing the results of somatic development of the examined swimmers with the research carried out by M. Napierała (2007) on children and adolescents from the Kuyavian-Pomeranian Voivodeship, the height of 15-year-old swimmers oscillates around 165.5 cm - 172 cm. When quoting the results of M. Napierała research, the boys in this age group have a normal developmental range of 172.22 cm in the city, and 170.24 cm in the village. For values in the city, swimmers are characterized by a lower body height than tested by Napierała (2007). The difference is from -6.72 cm to -0.22 cm, for rural values -4.74 cm and +1.76 cm.

Among swimmers, the body weight varies from 49.6 kg to 56.7 kg. However, the results obtained by Napierała (2007) showed different values. For the boys living in the city it was 59.64 kg, and for the group of boys living in the countryside it was 56.6 kg. In this case, swimmers show much lower body mass.

The training 14-year-old female athlete has a body height of 165 cm. According to a study conducted by M. Napierała (2007), females from the Kuyavian-Pomeranian district living in the city have reached 163,56 cm, while on the countryside 159.6 cm. Comparing the results, the female athlete has a higher body height of 1.44 cm than girls living in the city and 5.4 cm higher than group living in the countryside. The swimmer at the age of 14 years has reached a body weight of 55.3 kg. The girls examined by M. Napierała (2007) achieved 52.01 kg in the city, and 51.22 kg in the village. According to the data, the athlete has a higher body mass.

Summary

Analyzing the results of the impact of training macrocycles on the sports achievements of 14 and 15 - years old swimmers, the following conclusions has been made. Among all examined subjects during six months period the body high and weight progressed (body weight from 0.6 kg to 2, 1 kg, respectively by 0.91% - 3.82%). Under the influence of a properly conducted, and individualized training macrocycle, the athletes show a significant improvement in sports competition results confirmed by improvement of the sports classes.

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